Original Article

Post-traumatic Reactions and Their Predictors among Workers Who Experienced Serious Violent Acts: Are There Sex Differences?

Steve Geoffrion^{1,2*}, Jane Goncalves¹, André Marchand^{1,3},
Richard Boyer⁴, Alain Marchand⁵, Marc Corbière^{4,6} and Stéphane Guay^{1,7}

¹Trauma Studies Centre—Centre de recherche de l'Institut Universitaire en Santé Mentale de Montréal, 7331 rue Hochelaga, Montreal, H1N 3V2, Canada; ²School of Psychoeducation, Université de Montréal, PO Box 6128, Succursale Centre-Ville, Montreal, H3C 3J7, Canada; ³Department of Psychology, Université du Québec à Montréal, PO Box 8888, succursale Centre-ville, Montreal, H3C 3P8, Canada; ⁴Research Centre—Institut Universitaire en Santé Mentale de Montréal, 7331 rue Hochelaga, Montreal, H1N 3V2, Canada; ⁵School of Industrial Relations, Université de Montréal, PO Box 6128, succursale Centre-Ville, Montreal, H3C 3J7, Canada; ⁶Department of Education and Pedagogy, Université du Québec à Montréal, PO Box 8888, succursale Centre-ville, Montreal, H3C 3P8, Canada; ⁷School of Criminology, Université de Montréal, PO Box 6128, succursale Centre-ville, Montreal, H3C 3J7, Canada

*Author to whom correspondence should be addressed. Tel: +1-001-514-251-4015 Fax: +1-001-514-251-4014 e-mail: s.geoffrion@umontreal.ca

Submitted 8 June 2017; revised 16 January 2018; editorial decision 18 January, 2018; revised version accepted 8 February 2018.

Abstract

Background: Serious violent acts (e.g. physical violence, robbery, sexual aggression and death threats) are among the most visible and notable examples of workplace violence. Although women are commonly found to be at higher risk for post-traumatic reactions following workplace violence, little is known as regards sex differences concerning the types of post-traumatic reactions and their predictors.

Objective: This study aimed to describe sex differences in the post-traumatic reactions of serious violent acts and the predictors of such reactions.

Methods: The study was conducted among a convenience sample of 2889 French-speaking workers from Quebec, Canada by using a self-administrated survey. Linear regression modelings and *post-hoc* comparisons of coefficients according to the sex of the respondents were used to achieve the objective.

Results: Preliminary results confirmed that while men are more exposed to violence at work, women experience a greater number of post-traumatic reactions. Women were more affected by flashbacks, avoidance, and hypervigilance than men. The results also showed that being victimized by a male aggressor was associated with a greater number of post-traumatic reactions for women, whereas

being victimized by an insider (e.g. colleague, supervisor, employee) was associated with a greater number of post-traumatic reactions for both sexes.

Implications: These findings highlight the necessity to better consider sex as a potential determinant of mental health in studies on workplace violence.

Keywords: post-traumatic reactions; sex differences; workplace violence

For the most part, workplace violence literature focuses predominately on prevalence rates and psychological consequences (Lam, 2002; Leblanc and Kelloway, 2002; Merecz *et al.*, 2009; Hills and Joyce, 2013). It has been established that men and women experience violence differently (Santana and Fischer, 2000; Guay *et al.*, 2015), yet these differences are not systematically examined in studies concerning post-traumatic reactions to workplace violence. Even more so, the predictors of post-traumatic reactions according to sex have received little attention. With a multisectoral sample of victims, of Serious Violent Acts (SVAs), this paper explores the differences between men and women in the types of post-traumatic reactions they experience as victims of SVA in the workplace, as well as the predictors of these reactions.

SVAs, defined as behaviors leading to physical injuries as well as threats of such acts, represent the most visible and notable expression of workplace violence (Chappell and Di Martino, 2006; Guay *et al.*, 2016). SVAs in the workplace consist of physical violence, robbery, armed robbery, sexual touching, sexual assault, and death threat (Guay *et al.*, 2016). Studies on workplace exposure to SVAs have shown that men are commonly more likely to be victimized, but nuances exist concerning the sector within which they work and the type of acts sustained (Santana and Fisher, 2000; Guay *et al.*, 2015; Hills, 2017; van Reemst and Fischer, 2016). According to a recent systematic review (Guay *et al.*, 2015), men are more at risk in healthcare, in social work, in retail, and service industry settings, whereas women working in law enforcement and transportation professions were more often victimized than their male counterparts. However, many researchers on workplace violence argue that a worker's job function, rather than his occupation, is what puts them at risk of SVAs (Santana and Fischer, 2000). Such job functions include, but are not limited to, working alone and/or working at night, working with the public, providing service and care, etc. As regards types of acts, studies report that women have been found to be at greater risk of simple and nonfatal assaults, such as pinching, hitting, biting, kicking, as well as victims of rape and sexual assaults (Santana and Fischer, 2000; Guay *et al.*, 2015). The same studies report that men experience higher rates of aggravated assaults with

weapons such as shootings and stabbings, as well as robbery.

SVAs can trigger numerous and diverse psychological consequences, both emotional and cognitive. On a psychological level, the most frequently reported effects are anger, cognitive distraction, burnout, anxiety, depression, stress, psychological distress, and symptoms of post-traumatic stress disorder (PTSD) (Findorff *et al.*, 2005; Wilson *et al.*, 2011; Hills and Joyce, 2013; Jacobowitz, 2013; Tonso *et al.*, 2016; Zafar *et al.*, 2016). Differences exist between men and women concerning psychological consequences. In their literature review on sex differences in PTSD, Olff *et al.* (2007) found that women were more vulnerable in terms of the cognitive appraisal of potentially traumatic violent events. Compared with men, women tend to appraise events as being more stressful and inducing a higher loss of personal control, which may impact their use of efficient coping strategies when they face stressful situations (Olff *et al.*, 2007). This higher sensitivity among women could lead to a greater risk of developing psychological consequences following an SVA at work (Bryant and Harvey, 2003; Green and Diaz, 2008).

Beyond the current knowledge regarding sex differences, no previous studies have explored the types of post-traumatic reactions experienced following an SVA according to sex and their predictors. A better understanding of these differences could help to adapt prevention strategies for victims. Therefore, this article focuses on sex differences regarding post-traumatic reactions after a SVA and their predictors.

Predictors of post-traumatic reactions

Previous research outlines several predictors of the post-traumatic reactions of workplace violence. The frequency of incident exposure, the sex of the aggressor, and the relationship between the aggressor and the victim are known to influence post-traumatic reactions following an instance of workplace violence.

Repetitive exposure to workplace violence

Repetitive exposure to workplace violence as a predictor of psychological consequences is not agreed upon unanimously in the literature. Some studies have not

found significant differences between frequently exposed and infrequently exposed workers as regards symptoms of post-traumatic stress (Ryan *et al.*, 2008), whereas other studies have demonstrated a positive association between high levels of exposure to workplace violence and post-traumatic reactions (Arnetz and Arnetz, 2001; Lam, 2002; Whittington, 2002; Gates *et al.*, 2011; Demir and Rodwell, 2012; Lee *et al.*, 2015). Despite the discord, the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5) has recognized repetitive exposure to potentially traumatic events, such as SVA, as a possible cause of post-traumatic reactions (American Psychiatric Association, 2013). To our knowledge, no study has examined whether these associations differ according to sex. This information could be helpful for organizations when they deploy resources to support victims of SVAs in the workplace, especially in at-risk sectors.

The sex of the aggressor

Some studies have highlighted the importance of taking into consideration the sex of the aggressor in the examination of workplace violence. Results generally suggest that men are more aggressive than women (Gerberich *et al.*, 2004; Hahn *et al.*, 2008; Eagly, 2013) and that their acts of violence are much more damaging (Archer, 2004). Studies that focused on the perception of violence (Basow *et al.*, 2007) suggested that the sex of the aggressor and the sex of the victim significantly affected the victim's perception of the violent act and its consequences. Indeed, Basow *et al.* (2007) showed that male violence was commonly rated as more harmful than similar acts of violence perpetrated by women. However, we do not know whether the sex of the victim interacts with the sex of the aggressor in explaining the intensity of the consequences. The nature of the dyad (i.e. same sex versus opposite sex) could influence both the types of behaviors that occur as well as the post-traumatic reactions experienced by victims. To our knowledge, no studies have explored this question thus far.

Identity of the aggressor

The source of violence is another important factor that might lead to different reactions after exposure (LeBlanc and Kelloway, 2002; Merez *et al.*, 2009; Armmer and Ball, 2015; Kvas and Seljak, 2015). For instance, LeBlanc and Kelloway (2002) found that insider-initiated workplace violence, defined as violent acts committed by coworkers or supervisors, led to negative consequences on the victims' emotional and psychosomatic well-being. Merez *et al.* (2009) also observed a greater number of consequences following

violent acts initiated by insiders. These authors argued that insider-initiated violence might affect the health and functioning of workers because of its impact on the quality of long-term interpersonal relationships with colleagues. As regards, public-initiated violence, understood as violent acts committed by members of the public, LeBlanc and Kelloway (2002) did not find any link between this type of violence and psychological outcomes. However, other studies did not find any evidence that internal workplace violence resulted in more negative outcomes than external violence (De Puy *et al.*, 2015). Instead, De Puy *et al.* (2015) pointed to the fact that employer support toward workers is likely to be crucial for their recovery following a workplace violence incident, regardless of the identity of the aggressor. All in all, increasing scientific knowledge with regards to sex differences in the experience of workplace violence would help to both better prevent these behaviors and to offer more adapted responses to victims of both sexes, since their needs may differ.

The present study

The objective of this study is to explore sex differences in the types of post-traumatic reactions experienced by victims of SVA and in the predictors of these reactions. More precisely, the objective is to assess the potential differential impact of different types of exposure to workplace violence, the identity of the aggressor, and the sex dyad (same versus opposite sex) on the number of post-traumatic reactions experienced by male and female victims.

Method

Participants

The present study was lead among a convenience sample of 2889 French-speaking workers of Quebec, Canada. Women composed 58.9% of the convenience sample. To facilitate the recruitment process, we partnered with three organizations associated with the Agency for Health and Safety at Work, a governmental agency dedicated to preventive health and workplace safety. Our three partners were the Municipal Affairs (blue and white collar workers, e.g. police officers, bus drivers), the Provincial Affairs (civil servants, e.g. wildlife protection, transportation safety), and the Health and Social Services (health and social services workers, e.g. nurses, child protection workers). Participants were recruited by these three organizations. Consequently, our sample contained law officials (20.8% of which 39.0% were women), healthcare workers (49.4% of which 67.1% were women), first responders (2.1% of which 12.8%

were women), public servants (22.8% of which 67.4% were women), and public transportation workers (4.9% of which 41.1% were women).

Data were collected by a self-administered survey. Throughout January 2011 to October 2012, the organizations' employees were solicited by email or in person to complete the survey, either online or on paper. Due to the varying methods of communication (email to a generic list of employees, leaving paper copies of the survey in different service locations, etc.), it is impossible to know the total number of workers reached. First and foremost, workers were informed of the purpose of the study and were guaranteed anonymity. Most participants (87%) opted to fill out the questionnaire online, whereas 13% chose the paper version to be sent back by mail. There were no differences in the sociodemographic characteristics of the participants who chose the paper version over the online version of the questionnaire. This study was approved by the ethics committee of the Montreal Mental Health University Institute.

Measures

Survey questions were related to incidents of SVA that the respondents might have been victim to during the past 12 months and their repercussions. Questions also asked about the identity of the aggressor, their sex, and their relation with the workers (i.e. insider or outsider).

Sociodemographics

First, participants had to indicate whether they were a man or a woman. Second, they had to indicate their age. Five brackets were created for the age variable (1 = 15 to 25, 2 = 26 to 35, 3 = 36 to 45, 4 = 46 to 55, 5 = 56+).

Repetitive exposure to SVAs

The questionnaire included questions about victimization experiences with regards to six forms of SVAs (i.e. physical violence, robbery, armed robbery, sexual touching, sexual assault, and death threat). To assess the frequency of each act, participants were asked: 'During the last 12 months, how many times have you been a victim of the following acts at work?' Participants then indicated responses between 0 and '10 and more.' These variables accounted for the influences of any other SVAs that may have been experienced before or after the one identified as causing post-traumatic reactions.

Characteristics of the aggressor

We inquired about the sex and identity of the aggressor. Concerning the sex, respondents had to indicate whether the aggressor was a man, a woman, or unknown. A variable was created for the sex dyad (the sex of the victim

versus the sex of the aggressor) with '0 = opposite sex' and '1 = same sex' according to Blosnich and Bossarte's procedure (Merecz *et al.*, 2009). Respondents had to indicate whether the aggressor was a coworker, a supervisor, a subordinate, a client, a relative of a client, or other (e.g. a person within the workplace that is neither a worker of this organization nor a client). Based on these subgroups, the variable '*identity of the aggressor*' was created and consisted of two categories: insider and outsider. Coworkers, supervisors, and subordinates were labeled as insiders, whereas clients, client's relatives, and others were labeled as outsiders.

Post-traumatic reactions

Participants were also asked to indicate which SVA victimization was most disturbing to them in the last 12 months. Based on this event, the questionnaire measured the consequences of victimization. The assessment of post-traumatic reactions relied on the selection of several of the DSM-IV-TR Post-Traumatic Stress Disorder symptoms (Guay *et al.*, 2016; Geoffrion *et al.*, 2017). The symptoms selected in this study were the most salient ones among victims of violent acts. Participants were asked 'Among the following consequences, identify which appeared after the event (yes/no): flashbacks, nightmares related to the event, avoiding elements that arouse recollection of the event, loss of interest in pleasurable or important activities, sleep problems, hypervigilance, concentration problems, guilt, irritability, other psychological problems.' The number of experienced reactions was then summed. The scale was found to have high internal consistency (Cronbach's $\alpha = 0.88$; Geoffrion *et al.*, 2017). The post-traumatic reactions variable used in this study represents the sum of these 10 reactions (including other psychological problems), on a scale of 0 to 10.

Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS, version 22.0) and used $\alpha = 0.05$. Chi-square tests, *t*-tests, and Mann-Whitney were used for statistical analyses. This latter was used for data with non-normal distribution. A linear regression was then used to identify the most salient predictors of the number of post-traumatic reactions in a general model. Subsequently, models were performed separately for men and women. *Post hoc* comparisons of regression estimates were performed to investigate differences between these models as suggested by Paternoster *et al.* (1998). This method was used as it is generally recognized that subgroup analyses can produce spurious results and that inferring statistical differences

on the simple comparison of regression coefficients can be erroneous (Brookes *et al.*, 2004; Patsopoulos *et al.*, 2007; Nieuwenhuis *et al.*, 2011).

Results

In this sample, 18.9% of respondents experienced at least one SVA as a direct victim in the past 12 months, which represented 23.0% of men and 16.1% of women. Percentages of each form of SVA experienced by participants are presented in Table 1. Several statistical differences were observed between men and women. In sum, men were found to be more often victimized by physical violence, armed robbery, and death threats, whereas women were found to be more often victimized by sexual touching.

Of the 2889 respondents, 227 reported post-traumatic reactions following an SVA in the last 12 months, 169 reported post-traumatic reactions following experiencing an act of physical violence (74.4%), 47 of a death threat (20.7%), and 11 of sexual touching (4.8%). Of the respondents who experienced post-traumatic reactions, 50.7% were male and 49.3% were female. Chi-square test did not reveal statistical differences according to sex ($\chi^2 = 2.59$, $df = 1$, $P = 0.12$). In terms of sectors, 63.4% worked as healthcare providers, 21.1% as law officials, 11.0% as public transportation workers, 4.0% as public servants, and 0.4% as first responders. Since this distribution did not respect the postulate of chi-square test, we cannot assume significant differences. These 227 participants reported an average of 3.38 (SD = 2.72) types of post-traumatic reactions after their exposure to a SVA. Table 2 depicts the correlation matrix of the different measures in the global sample.

Table 1. Percentage distribution of victims for each form of SVA (yes/no) according to sex.

	Total		Men		Women		χ^2
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Physical violence	408	14.1	207	17.4	201	11.8	18.27***
Robbery	7	0.2	6	0.5	1	0.1	4.07**
Armed robbery	2	0.1	1	0.1	1	0.1	0.00 ^a
Sexual touching	68	2.4	18	1.5	50	2.9	6.15*
Sexual aggression	5	0.2	2	0.2	3	0.2	0.00 ^a
Death threats	288	10.0	169	14.2	119	7.0	40.90***
Total SVA	778	18.9	403	23.0	375	16.1	21.70***

N = 2889; *n* (men) = 1187; *n* (women) = 1702. Total SVA is not equal to the sum of each SVA because victims may have experienced several forms of SVA.

^aContinuity correction applied.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Sex differences in the number of post-traumatic reactions

Results show a significant difference according to sex, with women experiencing more symptoms than men ($M = 3.7$, versus 3.0 for men; Mann-Whitney U-test, $P < 0.05$). More women than men experienced flashbacks, avoidance, and hypervigilance (see Table 3).

Sex differences in the predictors of the number of post-traumatic reactions

The general linear regression model ($P < 0.001$), shown in Table 4, explained 17.3% of the variance of the predictors of post-traumatic reactions. Being older, being victimized by an insider and by an aggressor of the opposite sex was positively associated with the number of post-traumatic reactions. None of the different types of exposure to violence were predictors of the dependent variable.

Post hoc comparisons of these regression estimates revealed that only one predictor was statistically different according to sex. The sex dyad was a specific predictor for female participants only ($b = -0.04$, $SE = 0.70$ for men; $b = -2.26$, $SE = 0.72$ for women; corrected $z = 2.21$, $P = 0.021$). Here, women exposed to violence perpetrated by men had a greater number of post-traumatic reactions.

For all models, additional analyses were computed to adjust for the type of SVA experienced (i.e. physical, sexual or death threats). However, given that the majority of participants experienced physical violence, variance was not enough to provide sufficient power to detect any associations. Moreover, it did not influence the results obtained in the general and sex-specific models, nor did it significantly enhance the explained variance of post-traumatic reactions.

Discussion

The aim of the present study was to assess the post-traumatic reactions associated with SVAs at work and to explore the predictors of these consequences according to sex. Among a convenience sample of 2889 workers from different sectors, almost one-tenth of respondents had experienced a SVA as a direct victim. In accordance with previous studies (Santana and Fisher, 2000; Harrell, 2011; Guay *et al.*, 2015), more men than women were found to have experienced at least one incident of physical violence, robbery, and death threats over the last year, whereas more women reported having experienced sexual touching.

Post-traumatic reactions

Consistent with Findorff *et al.* (2005) and Canbaz *et al.* (2008) and biophysiological explanations (Olff *et al.*,

Table 2. Descriptive statistics and correlations among variables.

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Sex ^a	2889	1.59	0.49	—									
2. Age ^b	2882	3.19	1.10	-0.04*	—								
3. Physical violence ^c	2889	0.51	1.76	-0.07***	-0.11***	—							
4. Robbery ^c	2889	0.00	0.08	-0.04*	-0.02	0.09***	—						
5. Armed robbery ^c	2889	0.00	0.04	-0.01	-0.04	0.05**	0.62***	—					
6. Sexual touching ^c	2889	0.05	0.49	0.03	-0.03	0.27***	0.08***	0.10***	—				
7. Sexual aggression ^c	2889	0.01	0.15	0.02	-0.03	0.02	0.28***	0.38***	0.06**	—			
8. Death threats ^c	2889	0.31	1.34	-0.11***	-0.15***	0.59***	0.06**	-0.05**	0.12***	0.05***	—		
9. Identity agg ^d	223	0.09	0.29	-0.04	0.11	-0.21**	-0.04	0.00	-0.03	0.00	-0.12	—	
10. Dyad ^e	196	0.53	0.50	-0.64***	0.08	0.17*	0.07	0.00	-0.09	0.00	0.21**	0.02	—
11. Psych. cons.	216	3.38	2.72	0.13	0.18**	0.02	-0.08	0.00	0.11	0.00	0.02	0.23**	-0.20**

^a0 = women, 1 = men.^b1 = 15 to 25, 2 = 26 to 35, 3 = 36 to 45, 4 = 46 to 55, 5 = 56+.^cFrequency.^d0 = extern, 1 = intern.^e0 = different sex, 1 = same sex.**P* < 0.05; ***P* < 0.01; ****P* < 0.001.

Table 3. Percentage distributions of post-traumatic reactions (yes/no) experienced by victims of SVA and according to the most disturbing SVA according to sex

	Total		Men		Women		χ^2
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Flashbacks	94	45.0	39	36.4	55	53.9	6.44*
Nightmares	61	29.3	28	26.7	33	32	0.72
Avoidance	93	44.1	38	35.5	55	52.9	6.45*
Loss of interest in important or interesting activities	44	21.2	20	18.9	24	23.5	0.68
Sleep disturbance	89	42.4	44	41.1	45	43.7	0.14
Hypervigilance	105	49.3	43	39.4	62	59.6	8.66**
Concentration problem	62	29.5	26	24.5	36	34.6	2.57
Irritability	98	46.7	54	50.0	44	43.1	1.00
Guilt	55	26.3	26	24.5	29	28.2	0.35

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.**Table 4. Final model in linear regression: predicting number post-traumatic reactions due to most disturbing SVA experienced as victim**

	<i>B</i>	<i>SE</i>	β	95% CI	<i>P</i>
Predictors (<i>n</i> = 183)					
Age	0.59	0.18	0.24	0.24, 0.95	0.001
Frequency of physical violence	0.72	0.68	0.93	-0.06, 0.21	0.289
Frequency of robbery	-1.82	2.64	-0.05	-7.03, 3.39	0.491
Frequency of sexual touching	0.16	0.19	0.06	-0.21, 0.53	0.382
Frequency of death threats	0.16	0.08	0.16	-0.09, 0.32	0.064
Identity of the aggressor	2.22	0.66	0.24	0.93, 3.52	0.001
Dyad	-1.48	0.40	-0.27	-2.27, -0.70	0.000
Predictors for men (<i>n</i> = 94)					
Age	0.85	0.26	0.35	0.34, 1.36	0.001
Frequency of physical violence	0.21	0.10	0.27	0.00, 0.41	0.050
Frequency of robbery	-1.62	2.55	-0.06	-6.68, 3.44	0.526
Frequency of sexual touching	0.54	0.34	0.15	-0.13, 1.22	0.115
Frequency of death threats	0.06	0.11	0.08	-0.16, 0.28	0.577
Identity of the aggressor	3.23	0.86	0.36	1.53, 4.93	0.000
Dyad	-0.04	0.70	-0.01	-1.42, 1.34	0.952
Predictors for women (<i>n</i> = 89)					
Age	0.53	0.27	0.20	-0.00, 1.05	0.051
Frequency of physical violence	0.00	0.09	0.00	-0.18, 0.18	0.996
Frequency of sexual touching	-0.01	0.22	-0.00	-0.45, 0.44	0.973
Frequency of death threats	0.35	0.13	0.29	0.08, 0.61	0.012
Identity of the aggressor	1.19	0.98	0.13	-0.75, 3.13	0.226
Dyad	-2.26	0.72	-0.33	-3.69, -0.82	0.002

CI = confidence interval.

2007), female victims experienced significantly more post-traumatic reactions than male victims. Inconsistent with literature (Arnetz and Arnetz, 2001; Lam, 2002; AbuAlRub and Al-Asmar, 2011; Demir and Rodwell, 2012), the number of exposure to incidents of workplace violence was not found to have a significant impact on

the number of post-traumatic reactions with non-sex-based analyses.

Predictors of post-traumatic reactions

Age was found to be a predictor of post-traumatic reactions both for men and women. This may be explained

by the close relationship between age and exposure to workplace violence. Based on data from the National Crime Victimization Survey and the Census of Fatal Occupational Injuries, [Harrell \(2011\)](#) showed that among employed persons, those aged from 20 to 34 had the highest rate of being victimized by workplace violence. Thus, within the present sample, it is possible that age was a predictor of post-traumatic reaction because younger participants were more exposed to SVA and that a high frequency of exposure to SVAs is positively associated with more PTSD reactions ([Arnetz and Arnetz, 2001](#); [Whittington, 2002](#); [AbuAlRub and Al-Asmar, 2011](#); [Gates et al., 2011](#); [Demir and Rodwell, 2012](#)).

Sex-differentiated analysis revealed that the sex dyad of victim aggressor was only a predictor for female participants. For women, being victimized by a man increased the number of post-traumatic reactions experienced following SVA victimization. The power imbalance perceived by women when a man attacks them could explain these findings. This power imbalance, based on biological factors and maintained by social and cultural stereotype ([Miller, 1998](#); [Kilmartin, 2015](#); [McDermott, 2015](#)), may thus generate more intense feelings of fear and vulnerability and may influence the risk of developing post-traumatic reactions for women ([Guay et al., 2014](#)).

The identity of the aggressor was also found to be a predictor of post-traumatic reactions both for men and women. In line with previous studies, we found that insider violence had a significant impact on the number of post-traumatic reactions. Contrary to public-initiated violence, insider-initiated violence is still taboo, especially among workers in the healthcare sector ([Mayhew and Chappell, 2001](#)). These findings could be explained by the high probability of re-exposition to the aggressor, the culture of silence that may surround the violent act including either an implicit or explicit difficulty in reporting it or to be supported by management, especially when the SVA comes from management. This kind of violence relates to power struggles between the victim and the aggressor, where the aggressor can be perceived to be highly influential, more authoritative, and oppressive ([Koh, 2016](#)). The impact of insider-initiated violence is particularly important for victims because it affects the quality of human relationships within the workplace for longer periods of time ([Merecz et al., 2009](#)). However, this predictor did not differ according to sex.

Altogether, these results demonstrate that sex is an important determinant for the examination of serious workplace violence. Age and the identity of the aggressor were significant predictors for both sexes: only men were found to be sensitive to the frequency of physical violence, and only women were sensitive to the sex of the aggressor.

Limitations

The results of this study should be interpreted cautiously due to a number of limitations. First, the generalizability of the results is limited by the nature of our convenience and nonrepresentative sample. Second, due to the cross-sectional design of the study, it is not possible to make causal inferences. Third, answers were obtained via self-report, which can produce several biases (e.g. underestimation, social desirability). As such, it is pertinent to assess SVA and its consequences by combining methods (e.g. official reports, interviews). In order to minimize recall bias, the questionnaire only focused on victimization that occurred during the past year. As mentioned by [Nachreiner et al. \(2007\)](#), this method has been used successfully in previous studies, and the sample size in the present study allowed for a robust analysis of the data. Fourth, different forms of SVA were not defined to the respondents and thus left open to interpretation with a risk of false estimation. Fifth, neither the intensity nor the duration of post-traumatic reactions was assessed with a standardized or validated measure. Sixth, we did not consider certain forms of violence, such as bullying, that might have accounted for a unique amount of variance in post-traumatic reactions. Seventh, variability in terms of SVA experienced that can trigger post-traumatic reactions was not enough to detect any sex-specific associations between the type of SVA and subsequent post-traumatic reactions. Yet, studies have shown that the type of violent act and severity experienced (e.g. physical, sexual or death threats) is differentially patterned between men and women and is likely related to different post-traumatic stress reactions ([Mayhew and Chappel, 2001](#); [Tolin and Foa, 2006](#)). Eighth, since few of the participants reported experiencing post-traumatic reactions, it was not possible to compare outcomes according to work sectors. Finally, the study was a survey for which we needed to gather a large amount of information succinctly, which implies that we could not delve further into each topic.

Implications

Despite these limitations, the findings of this study provided further knowledge about the differential consequences of SVAs at work for men and women. Considering the source of violence (internal versus external) is important in supporting victims of SVA in the workplace, for both men and women. An internal source of violence generates more stress and a greater risk of developing post-traumatic reactions, especially because the victim faces a high probability of encountering the aggressor on a regular basis. In the context of the return to work after a sick leave due to a SVA, it could be interesting to develop with the supervisor or

human resources strategies to prevent specific and difficult work situations, particularly when the victim could eventually encounter the aggressor in the workplace (e.g. a colleague). For example, in the first weeks of the return to work, the victim and the supervisor could make sure that the victim would not find himself alone with the aggressor, isolated from other colleagues.

According to our findings, there is a need to consider repetitive exposure to SVAs and not only the most disruptive incident experienced by victims, even though this particular incident may be the object of the consultation. Future research is needed to determine whether the lifetime history of victimization would better explain post-traumatic reactions. Still, workplaces that are at high risk of violence should be prepared to provide effective and immediate psychological help following violent incidents for exposed workers in order to reduce the risk of developing post-traumatic reactions.

From a research perspective, our results highlight the necessity to include sex as a potential determinant of mental health in studies on workplace violence. Future research should aim to better assess and understand sex with regards to other psychological consequences such as work-related functioning issues. It would also be interesting to focus on the impact of these consequences on help-seeking behaviors. Further research should also focus on strategies both to better identify high-risk situations for insider-initiated violence and to break the taboo surrounding it. Sex and gender (i.e. cultural expectations towards men and women) should be considered in the study of insider-initiated violence, given their association with power struggles (Oakley, 2000).

Funding

This research was supported by a research grant awarded to the last author by the Foundation of Institut universitaire en santé mentale de Montréal and by a research grant awarded to the VISAGE research team by the Canadian Institutes of Health Research (CIHR - TVG251591).

Conflict of Interest

The authors declare no conflict of interest relating to the material presented in this Article. Its contents, including any opinions and/or conclusions expressed, are solely those of the authors.

References

Abualrub RF, Al-Asmar AH. (2011) Physical violence in the workplace among Jordanian hospital nurses. *J Transcult Nurs*; 22: 157–65.

- American Psychiatric Association. (2013) *Diagnostic and statistical manual of mental disorders (DSM-5®)*. Arlington, VA: American Psychiatric Publishing.
- Archer J. (2004) Sex differences in aggression in real-world settings: a meta-analytic review. *Rev Gen Psychol*; 8: 291–322.
- Armmer F, Ball C. (2015) Perceptions of horizontal violence in staff nurses and intent to leave. *Work*; 51: 91–7.
- Arnetz JE, Arnetz BB. (2001) Violence towards health care staff and possible effects on the quality of patient care. *Soc Sci Med*; 52: 417–27.
- Basow SA, Cahill KF, Phelan JE *et al.* (2007) Perceptions of relational and physical aggression among college students: effects of gender of perpetrator, target, and perceiver. *Psychol Women Quart*; 31: 85–95.
- Brookes ST, Whitely E, Egger M *et al.* (2004) Subgroup analyses in randomized trials: risks of subgroup-specific analyses; power and sample size for the interaction test. *J Clin Epidemiol*; 57: 229–36.
- Bryant RA, Harvey AG. (2003) Gender differences in the relationship between acute stress disorder and posttraumatic stress disorder following motor vehicle accidents. *Aust N Z J Psychiatry*; 37: 226–9.
- Canbaz S, Dündar C, Dabak S *et al.* (2008) Violence towards workers in hospital emergency services and in emergency medical care units in Samsun: an epidemiological study. *Ulus Trauma Acil Cerrahi Derg*; 14: 239–44.
- Chappell D, Di Martino V. (2006) *Violence at work*. Geneva, Switzerland: International Labour Organization.
- De Puy J, Romain-Glassey N, Gut M *et al.* (2015) Clinically assessed consequences of workplace physical violence. *Int Arch Occup Environ Health*; 88: 213–24.
- Demir D, Rodwell J. (2012) Psychosocial antecedents and consequences of workplace aggression for hospital nurses. *J Nurs Scholarsh*; 44: 376–84.
- Eagly AH. (2013) *Sex differences in social behavior: a social-role interpretation*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Findorff MJ, McGovern PM, Wall MM *et al.* (2005) Reporting violence to a health care employer: a cross-sectional study. *AAOHN J*; 53: 399–406.
- Gates DM, Gillespie GL, Succop P. (2011) Violence against nurses and its impact on stress and productivity. *Nurs Econ*; 29: 59–66.
- Geoffrion S, Goncalves J, Boyer R *et al.* (2017) The effects of trivialization of workplace violence on its victims: profession and sex differences in a cross-sectional study among healthcare and law enforcement workers. *Ann Work Expo Health*; 61: 369–82.
- Gerberich SG, Church TR, McGovern PM *et al.* (2004) An epidemiological study of the magnitude and consequences of work related violence: the Minnesota Nurses' Study. *Occup Environ Med*; 61: 495–503.
- Green DL, Diaz N. (2008) Gender differences in coping with victimization. *Brief Treat Crisis Interv*; 8: 195–203.
- Guay S, Goncalves J, Jarvis J. (2014) Verbal violence in the workplace according to victims' sex—a systematic review of the literature. *Aggress Violent Beh*; 19: 572–78.

- Guay S, Goncalves J, Jarvis J. (2015) A systematic review of exposure to physical violence across occupational domains according to victims' sex. *Aggress Violent Behav*; 25: 133–41.
- Guay S, Goncalves J, Marchand A. (2016) Predictors of reporting workplace violence to an employer according to sex: a cross-sectional study. *Violence Gend*; 3: 157–161.
- Hahn S, Zeller A, Needham I *et al.* (2008) Patient and visitor violence in general hospitals: a systematic review of the literature. *Aggress Violent Behav*; 13: 431–41.
- Harrell E. (2011) Workplace violence, 1993–2009: national crime victimization survey and the census of fatal occupational injuries. Available at http://digitalcommons.ilr.cornell.edu/key_workplace/809. Accessed 3 January 2017.
- Hills D, Joyce C. (2013) A review of research on the prevalence, antecedents, consequences and prevention of workplace aggression in clinical medical practice. *Aggress Violent Behav*; 18: 554–69.
- Hills DJ. (2017) Differences in risk and protective factors for workplace aggression between male and female clinical medical practitioners in Australia. *Aust Health Rev*; 41: 313–320.
- Jacobowitz W. (2013) PTSD in psychiatric nurses and other mental health providers: a review of the literature. *Issues Ment Health Nurs*; 34: 787–95.
- Kilmartin C. (2015) Men's violence against women: an overview. In Johnson AJ, editor. *Religion and men's violence against women*. New York, NY: Springer. pp. 15–25.
- Koh W. (2016) Management of work place bullying in hospital: a review of the use of cognitive rehearsal as an alternative management strategy. *IJNSS*; 3: 213–22.
- Kvas A, Seljak J. (2015) Sources of workplace violence against nurses. *Work*; 52: 177–84.
- Lam LT. (2002) Aggression exposure and mental health among nurses. *AeJAMH*; 1: 89–100.
- LeBlanc MM, Kelloway EK. (2002) Predictors and outcomes of workplace violence and aggression. *J Appl Psychol*; 87: 444–53.
- Lee J, Daffern M, Ogloff JR *et al.* (2015) Towards a model for understanding the development of post-traumatic stress and general distress in mental health nurses. *Int J Ment Health Nurs*; 24: 49–58.
- Mayhew C, Chappell D. (2001) *Occupational violence: types, reporting patterns, and variations between health sectors*. School of Industrial Relations, University of New South Wales, Sydney, Australia.
- McDermott R. (2015) Sex and death: gender differences in aggression and motivations for violence. *Int Organ*; 69: 753–75.
- Merecz D, Drabek M, Mościcka A. (2009) Aggression at the workplace—psychological consequences of abusive encounter with coworkers and clients. *Int J Occup Med Environ Health*; 22: 243–60.
- Miller SL. (1998) *Crime control and women: feminist implications of criminal justice policy*. Thousand Oaks, CA: Sage Publications.
- Nachreiner NM, Gerberich SG, Ryan AD *et al.* (2007) Minnesota nurses' study: perceptions of violence and the work environment. *Ind Health*; 45: 672–8.
- Nieuwenhuis S, Forstmann BU, Wagenmakers EJ. (2011) Erroneous analyses of interactions in neuroscience: a problem of significance. *Nat Neurosci*; 14: 1105–7.
- Oakley JG. (2000) Gender-based barriers to senior management positions: understanding the scarcity of female CEOs. *J Bus Ethics*; 27: 321–34.
- Olf M, Langeland W, Draijer N *et al.* (2007) Gender differences in posttraumatic stress disorder. *Psychol Bull*; 133: 183–204.
- Paternoster R, Brame R, Mazerolle P *et al.* (1998) Using the correct statistical test for the equality of regression coefficients. *Criminology*; 36: 859–66.
- Patsopoulos NA, Tatsioni A, Ioannidis JP. (2007) Claims of sex differences: an empirical assessment in genetic associations. *JAMA*; 298: 880–93.
- Ryan EP, Aaron J, Burnette ML *et al.* (2008) Emotional responses of staff to assault in a pediatric state hospital. *J Am Acad Psychiatry Law*; 36: 360–8.
- Santana SA, Fisher BS. (2000) Workplace violence in the united states: are there gender differences? *Secur J*; 13: 39–52.
- Tolin DF, Foa EB. (2006) Sex differences in trauma and post-traumatic stress disorder: a quantitative review of 25 years of research. *Psychological Bulletin*; 132: 959.
- Tonso MA, Prematunga RK, Norris SJ *et al.* (2016) Workplace violence in mental health: a victorian mental health workforce survey. *Int J Ment Health Nurs*; 25: 444–51.
- van Reemst L, Fischer TFC. (2016) Experiencing external workplace violence differences in indicators between three types of emergency responders. *J Interpers Violence*; 1–26. Available at <https://www.ncbi.nlm.nih.gov/pubmed/27413089>.
- Whittington R. (2002) Attitudes toward patient aggression amongst mental health nurses in the 'zero tolerance' era: associations with burnout and length of experience. *J Clin Nurs*; 11: 819–25.
- Wilson CM, Douglas KS, Lyon DR. (2011) Violence against teachers: prevalence and consequences. *J Interpers Violence*; 26: 2353–71.
- Zafar W, Khan UR, Siddiqui SA *et al.* (2016) Workplace violence and self-reported psychological health: coping with post-traumatic stress, mental distress, and burnout among physicians working in the emergency departments compared to other specialties in pakistan. *J Emerg Med*; 50: 167–77.e1.